

attention was turned to the cultivation of the soil. Round the huts, accordingly, were patches of land in potatoes, turnips, and cabbage, which at least this year yielded abundant crops, though the colony is situated in the latitude of Avaxa, that is to say, under the Arctic circle.

Later in the day we came to the Monastery of Troit, in former times renowned and rich, now inhabited only by a single monk, viz., the prior himself. He was a worthy old man, who gave us a hospitable and friendly reception. The apartment for the reception of guests was adorned with a number of portraits of Siberian bishops. There was besides a portrait of a Russian Czar in powdered hair and military uniform, with blue great cross riband. It was a portrait of Czar Paul, but through some exchange the Skoptists had taken it into their heads that the portrait represented their holy prophet, Czar Peter III., whose history they had completely altered in accordance with their idealised conception of the world. An educated man, who belonged to this sect, and on this account had been banished to North Jenisei, informed me accordingly in all seriousness that Czar Peter III. was not murdered, but was knouted and sent to Siberia, &c., all on account of his holiness—as so it happens now that in consequence of all this the portrait of Czar Paul in the Troit Monastery is a sacred picture to which worship is offered.

A. E. NORDENSKJÖLD

(To be continued.)

### SCIENTIFIC SERIALS

THE *Journal of the Chemical Society* for December 1875 contains the following papers communicated to the Society:—On the agricultural chemistry of the tea-plantations of India, by J. Campbell-Brown, D.Sc. This lengthy paper contains analyses of the young and old leaves of good plants and of stunted and blighted plants of different varieties, analyses of the wood of good and stunted tea-plants of different varieties, analyses of tea-seed, of the soils of tea-plantations, and of tea from manured and unmanured plants. The author discusses also the analytical results.—On certain new reactions of tungsten, by Prof. J. W. Mallett, of the University of Virginia. The author has found, contrary to the statements in text-books, that the precipitate produced by hydrochloric acid in a solution of an alkaline tungstate is soluble in an excess of the concentrated acid. By adding fragments of metallic zinc to the above-named acid solution, various colours are produced, the most noteworthy being a brilliant magenta. Potassium sulphocyanate and metallic zinc added to the acid solution produce a rich green colour, but when the sulphocyanate is added first to the alkaline tungstate solution, then a considerable quantity of water, then hydrochloric acid, and finally zinc, a fine amethyst colour is produced. The blue colour well known as characteristic of one of the lower oxides of tungsten may be best brought out by the use of hyposulphurous acid ( $\text{H}_2\text{SO}_3$ ) as the reducing agent.—The remainder of the journal contains the usual collection of abstracts.

*American Journal of Science and Arts*, Dec. 1875.—This number commences with a paper of careful observations by Prof. Dana on five of the river valleys of Southern New England, with a view to ascertaining the depression of that region during the melting of the glacier. This he estimates at about 15 feet. He considers that the terraces in the Housatonic, Connecticut, and Thames, which are now so high above the river's surface, were not wholly, or mostly formed when the land was at a much lower level than now, but they were formed when the rivers were at a greatly higher level than now, owing chiefly to the glacial flood. Thus we may have high and numerous terraces along valleys, and yet none be due to an elevation of the land. The height of the streams during the flood above high tide level is estimated in one case at as much as 237 feet (from which the 15 feet depression would be deducted). The amount of depression increased from the south northwards at about one foot and a half per mile, since Dawson has shown that the height of the beaches at Montreal indicate a depression there of 500 feet. The waters from the melting glacier must have brought down the streams in vast volume to have piled to so great heights before outlets so wide and deep.—Prof. Storer, of Harvard, gives some observations which show (after Schönbein) that ammonia is a constant contaminant of sulphuric acid, and further, that it is a more frequent impurity in chemical substances (prepared with aid of sulphuric acid) than has been supposed.—An abstract is given of a memoir by Prof. Suess of Vienna on the origin of the

Alps.—Mr. Andrews describes some new and interesting coal-plants from Perry County, Ohio, and Dr. Becker calls attention to a new feature in the "Comstock Lode" in Nevada.—In a letter from Dr. Gould, of Cordoba Observatory, the writer states that his zone observations, begun in 1872, are now completed; and the entire region from  $23^{\circ}$  to  $80^{\circ}$  of south declination has been carefully scrutinised. The  $10^{\circ}$  round the pole have been examined by Gillis at Santiago and Stone at Cape of Good Hope, and Gould's northern limit overlaps Argeländer's southern zone by eight degrees (as Argeländer had requested).

Supplementary December Number.—Mr. Langley here contributes a paper on the solar atmosphere, being introductory to an account of researches made at the Alleghany Observatory. The estimates of the absorptive power of this atmosphere, based on photometric comparison of the centre and edge of the sun, have been widely discrepant; thus Arago thought the light of the centre must be diminished  $2\frac{1}{4}$  per cent. to equal that of the edge; Liais's estimate is 10 and Secchi's 73 per cent. Mr. Langley here describes a new method of measurement free from some of the objections to previous ones; and he thinks the estimates of Secchi (who used La Place's formula) are certainly in excess of the truth. Not much more or less than one half (he considers) of the whole so-called "luminous heat rays" are absorbed, turned back, or converted into work, in the sun's atmosphere. The total thermal absorption is somewhat less. The method is also applicable to sun-spots, &c., and Mr. Langley finds the absolute light of the "nuclei" in spots at least five thousand times that of the full moon.—In a supplemental paper on Southern New England during the melting of the great glacier, Prof. Dana discusses the overflows of the flooded Connecticut, which he concludes was at that time a great stream 150 feet deep and fifteen miles wide.

### SOCIETIES AND ACADEMIES

LONDON

Royal Society, Jan 6.—On the length of the Spark from a Battery of 600, 1,200, 1,800, and 2400 rod-Chloride of Silver, and some Phenomena attending the Discharge of 5,640 Cells. By Warren De La Rue, D.C.L., F.R.S., and Hugo W. Muller, F.R.S.

On the 24th February, 1875,\* we had the honour of communicating to the Society, in conjunction with our friend Mr. Spottiswoode, an account of some experiments to ascertain the cause of stratification in electrical discharges *in vacuo*. These experiments were made with a battery of 1,080 cells of powder-chloride of silver, which was described; we have now in action 3,240 such cells, and have recently completed 2,400 rod-chloride of silver cells,† making our total force 5,640 cells in action. To these will be shortly added another unit of 1,080 cells powder-chloride, and two other units of 1,200 rod-chloride, making a total of 9,120 cells.

We have more recently made a verbal communication to the Society of Telegraph Engineers, and also in October last a written one to the Académie des Sciences of Paris‡, wherein we have stated that the length of the spark in air appears to be in the direct ratio of the square of the number of cells.

Having completed the 2,400 cells, and charged them up in a single day, they were exactly in the same condition as to electromotive force and internal resistance, consequently they afforded the means of testing the truth of the law of the length of spark in a manner more efficacious than had hitherto obtained, the more especially as by the use of paraffin corks and other precautions we had obtained an excellent insulation.

Our assistant, Mr. Fram, has constructed a discharger which permits of the accurate measurement of the distance of the terminals to read to  $\frac{1}{1000}$  of an inch, and by estimation to the tenth of that quantity. The nut, through which the screw ( $\frac{1}{8}$  of an inch), carrying one of the terminals, works, is divided into two parts, which are separated by a spiral pressure-spring, so as to prevent shake. In making measurements the terminals are separated to a greater quantity than the anticipated striking-distance, and gradually approached until the spark passes; the discharge is then detached from the battery, and after reading the scale, connected up with a separate battery of 10 cells, with a detector-galvanometer in circuit. The terminals are again approached until the motion of the galvanometer indicates contact between

\* Proc. Roy. Soc., No. 160, 1875.

† Proc. Roy. Soc., No. 160, 1875, p. 357.

‡ "Comptus Rendus," No. 16, p. 686; No. 17, p. 746, 1875.

them; the scale is again read, and the length of spark obtained by the difference between the first and second reading.

Rod-chloride, 600 cells had a striking-distance of	0'0033 in.
" 1200 "	0'0130
" 1800 "	0'0345
" 2400 "	0'0535

Taking as the unit 600 cells, the spark of which was 0'0033, the length of spark of 1,200, 1,800, 2,400 would, according to theory, be that number multiplied by the square of 2, 3, 4 respectively.

600 cells, striking-distance.....	0'0033 in.
1200 "	0'0033 × 4.... 0'0132
1800 "	0'0033 × 9.... 0'0297
2400 "	0'0033 × 16.... 0'0528

which numbers agree nearly with those obtained by experiment.

The length of the spark is much influenced by the shape of the terminals, those which we frequently employ consist of a point as one terminal and a plane for the other; hitherto we have used copper terminals, making the point and the plane alternately positive and negative by means of a double-key discharger, or by a rapidly-revolving commutator reversing up to 352 times in a second. One terminal in the above determinations consisted of a point of 30°, and the other of a slightly convex surface 0'46 inch in diameter.

While making these measurements, we noticed in a nearly dark room that when the point was negative a glow, in form like a paraboloid, was seen surrounding it long before the spark passed, and its appearance afforded by its increasing brilliancy useful information to guide us as to the more cautious approach of the terminals; gradually the sugar-loaf-like glow extended to the positive terminal. With 1,800 cells the glow was seen when the terminals were 0'0545 inch apart, the spark passing at 0'0345 inch; with 2,400 cells the glow began at a distance of 0'0865 inch, the spark passing at 0'0535 inch. Moreover, it was noticed that the disc (positive) became covered all over with a peach-like bloom, which became stronger in the centre as the terminals were made to approach each other, giving rise to Newton's iridescent rings.

In order to study more readily the phenomena accompanying the glow preceding the spark, the whole series of 5,640 cells was used, the terminals being a point as before of 30°, and sometimes a flat disc 1'1 inch in diameter, or a slightly convex one of 0'8 inch in diameter for the other. In all cases a peach-like bloom deposited on the disc, which was connected with the silver (positive) terminal; and when the flat disc was used the deposit was notably greater at the periphery and the centre than in other portions of it. With this number of cells, with the flat disc the glow occurred at 1'073 in., the spark at 0'139 in. With the slightly convex disc occurred at 1'124 in., the spark at 0'140 in.\*

To ascertain whether a current really passed when the glow appeared, various vacuum-tubes were interposed in circuit between the battery and one of the terminals; in all cases they were illuminated even before a glow was perceptible on the negative pole; their interposition, as was to be expected, shortened the spark and diminished the distance at which the glow was perceptible. For example, with a hydrogen tube, having a capillary portion between two larger tubes, such as is used for spectrum experiments, and offering a resistance of 190,000 ohms, the glow occurred at 0'939 inch, the spark at 0'092 inch.

A tube of 31 inches between the terminals, and offering a resistance of 350,000 ohms, was brilliantly illuminated when interposed between one terminal and the battery; when the terminals were separated the extreme range of the discharge was 1'2 inch, and before any glow was visible at the negative electrode. How much further between the electrodes it will be possible to obtain a current has yet to be determined with a larger discharger now in course of construction.†

I have alluded to the resistance offered by vacuum-tubes. At first I experienced considerable difficulty in measuring it. For example, when in a Wheatstone's bridge the resistance of the tube was balanced by inserted resistances, the galvanometer could only for a short time be brought to rest, and it was then found that the cause of this was that the tubes rapidly increased in resistance as the current passed. After a time, however, they

recovered their original resistance, sometimes rapidly, sometimes only after the lapse of days. The resistances were found not to be dependent on the length of tube, but to a great extent on their bore, capillary tubes offering a considerable resistance. Ultimately it was found that it was better to discard the indications of the galvanometer, and to rely solely on the appearance of a luminosity in the tubes placed on one side of Wheatstone's bridge as soon as the insertion of a balancing resistance was made in the other.

Later on we hope to have the honour of sending to the Society a more detailed statement of our experiments in support of those now quoted, and in confirmation of our former paper on the cause of stratification in electric discharges *in vacuo*.

In conclusion we venture to draw attention to the following consequences of the law of the length of spark being dependent on the ratio of the square of the number of cells of a voltaic battery, in the event of its being confirmed by experiment. Taking as a basis the spark with 600 cells of the rod-chloride of silver battery = 0'0033 inch, a unit of 1000 such cells would give a spark of  $\frac{0'0033 \times 1000^2}{600^2} = 0'009166$  inch,

one hundred units (100,000) a spark of 91'66 inches, a thousand units (1,000,000) " 91'66 " = 764 feet nearly,

whereas a single cell would have a striking-distance of  $\frac{1}{1000000}$  of an inch only. As far as our own experiments have gone the law has been confirmed; and although a million cells will probably never be made, a hundred thousand come within the range of experimental possibility.

Geological Society, Jan. 19.—John Evans, president, in the chair.—James Buckingham Bevington, William P. Blake, James Gordon Brickenden, Edward George Dyke, Henry Hamilton Gunn, William Jerome Harrison, and R. G. Warton, were elected Fellows of the Society.—On some unicellular algae parasitic within Silurian and Tertiary corals, with a notice of their presence in *Calceola sandalina* and other fossils, by Prof. P. Martin Duncan, F.R.S. After noticing the works of Quekett, Rose, Wedl, and Kölliker, which refer to the existence of minute parasitic borings in recent corals, recent shells, and a few fossil mollusca, the author describes the appearance presented by a great system of branching canals of about 0'003 millim. in diameter, in a *Thamnastræan* from the Lower Cainozoic of Tasmania. He then proceeds to examine the corresponding tubes in *Goniophyllum pyramidale* from the Upper Silurian formation. In sections of that coral one set of tubes runs far into the hard structure; these are straight, cylindrical, and contain the remains of vegetable matter. Neither these tubes, nor any others of the same parasite, have a proper wall: they are simply excavations, the filiform alga replacing the organic and calcareous matter abstracted. In some places the dark carbonaceous matter is absent, and the lumen of the tube is distinguishable by the ready passage of transmitted light. Other tubes run parallel to the wall, and enter by openings not larger than their common calibre. But there are others which have a larger diameter, and in which the cytoplasm appears to have collected in masses resembling conidia; and where fossilisation has destroyed much of the continuity of a tube a series of dark and more or less spherical bodies may be seen. In some places, especially in the spaces between the minute curved dissepiments and tabulae, hosts of globular spores, with or without tubes emanating from them, may be seen. In *Calceola sandalina* corresponding structures exist sometimes, and the method of entry of the parasite can be examined. The author gave two instances, one of which was seen in section. A decided flask-shaped cavity existed in the wall of the shell, opening outwards and rounded and closed inwards. It was crowded with globular spores (oospores), and these, where near the sides, had penetrated the hard shell, and thus gave a rugged and hairy appearance to the outline of the flask-shaped cavity. After noticing minute structures in a brachiopod included in a Silurian coral, and in a Lower Silurian foraminifer, the author asserted, from the results of his late researches upon the algae parasitic in corals out of his own aquarium, that the fossil and recent forms are analogous in shape, size, and distribution. He considers that the old parasite resembles *Saprolegnia ferox* in its habit; and as he considers that *Empusina*, *Saprolegnia*, and *Achlya*—members of the Protista—are the same organisms, living under different physical conditions, he names the old form *Palaechlya penetrans*; and he believes that it entered the wall by the spores fixing on to the organic matter, and growing by its assimilation, and that car-

\* Postscript, Jan. 7.—At the suggestion of Prof. Stokes, who saw the experiment repeated, the point was made positive, when a longer spark was obtained, namely, 0'154 inch and 0'164 inch.

† Postscript, Jan. 8th.—A current was obtained with the negative point distant 5'1 inches from a positive plate 6 inches in diameter.

bonic anhydride was evolved. He considers that this acid, assisted by the force of growth and the movement of the cytoplasm, are sufficient to account for the presence of the tubes. Finally, the author draws attention to the probable similarity of external conditions in the Silurian and present times, and to the wonderful persistence of form of this low member of the Protista.—How Anglesey became an Island, by Prof. A. C. Ramsay, F.R.S. The author described and illustrated by sections drawn to scale the contours of the island of Anglesey and the adjacent parts of Carnarvonshire, and noticed that the whole island may be regarded as a gritty undulating plain, the higher parts of which attain an average elevation of from 200 to 300 feet above the sea-level. Similar conditions are presented by the country for some miles on the other side of the straits, and in both the general trend of the valleys is north-east and south-west. The rock surfaces, when bare, show glacial striae running generally in a direction  $30^{\circ}$  to  $40^{\circ}$  west of south. The author indicated that the great upheavals of the crust of the earth forming mountains took place long before the commencement of the Glacial epoch, and that ordinary agents of denudation had ample time for the formation in mountain regions of deep valleys, down which, during the Glacial epoch, glaciers would take their course. He noticed the evidence of this local glaciation furnished by the striation of the Welsh mountains, from which he inferred that these mountains as a whole were not overridden by a great ice-sheet coming from the north, and he described the course of the glaciers flowing from the north-west slopes of Snowdonia as being in the directions west, north-west, and north. These glaciers, however, did not reach the region now occupied by the Menai Straits, but spread out in broad fans on the north-western slopes of the hills now overlooking the Straits, a fact indicated by the directions of the glacial striae in these parts. Anglesey, therefore, was not glaciated by ice-masses coming from Snowdonia; and as the striations on that island point directly towards the mountains of Cumberland, the author inferred that these markings were produced by a great ice-flow coming from that region, reinforced probably by ice-streams from the north of Scotland, and which were large and powerful enough to prevent the glaciers of Llanberis and Nantfriancon from encroaching on the territory of Anglesey. The author described the rocks bordering the Straits as consisting of nearly horizontal Carboniferous strata, which, from appearances, must once have filled the whole of the region now occupied by the Straits. He considered that the softer shaly, sandy, and marly beds, remains of some of which are still to be seen on the coast, were swept away by the action of the great glacier coming from the north-east, forming a valley now occupied by the sea; and in support of this view he cited the valley of Mallaeth Marsh, running across Anglesey, parallel to that of the Menai Straits, about four miles to the north-west, which a very slight change in conditions would convert into a fjord, differing from the Straits only in being closed at the north-east end.

**Meteorological Society, Jan. 19.**—Dr. Mann, president, in the chair.—The report of the Council showed that a large amount of work had been done, and that the number of Fellows had greatly increased. The first-class observing stations, which were organised in 1874, have been in regular working order during the past year, their number has been increased, and several have been reinspected. A very interesting account of all that has been done in organising the stations, with the conditions to be fulfilled by the observers in respect to instruments and exposure, the mode of inspecting, and a concise description of each station, with a ground plan on an uniform scale, has been prepared by Mr. Symons. An arrangement has been entered into with the Meteorological Office by which the Society has agreed to furnish, for a consideration, copies of observations from a definite number of stations. Various instructions for observers, prepared by the Station Committee and the Assistant-Secretary, are also given. The joint Committee of Delegates from this and other Societies, appointed to draft complete instructions for the observation and registration of natural periodical phenomena, have finished their labours and sent in their report. A code of rules entitled "Instructions for the Observation of Phenological Phenomena" has been prepared and published. The Rev. T. A. Preston has discussed the first year's observations, and his report is given in full. The Council have taken up the solar radiation observations commenced by the Rev. F. W. Stow, but they intend to compare the readings of the black bulb thermometer *in vacuo* with a bright bulb thermometer also *in vacuo*, both mounted alike, instead of the maximum thermometer in

the shade. The Council have also appointed a Permanent Lightning Rod Committee to investigate and record accidents from lightning, to inquire into the principles involved in the protection of buildings, to diffuse exact information regarding the best form and arrangement for lightning conductors, and to consider all phenomena of atmospheric electricity. The balance-sheets show that the Society is in a very satisfactory condition.—The President then delivered his address. In alluding to the establishment of a carefully planned series of observing stations by the Society he illustrated at some length the absolute necessity of following out the inductive method of research in meteorology, and supported his argument by a reference to the history of all the leading branches of physical investigation, in which the prophetic insight of inspired minds had invariably had to be elaborated and perfected by the patient labour of subsequent observation and experiment. He compared the meteorological doctrine of high and low pressure areas of the atmosphere, and of the movement of currents of the air, under the influence of the barometric gradient, to the Newtonian doctrine of gravitation in astronomical physics, to the Daltonian hypothesis of atomic proportions in chemistry, to the dynamic theory of the tides, and to Avogadro's law of the uniformity of the atomic constitution of gases under like conditions of pressure and temperature, and maintained that the perfection and practical application of this law must be worked out by organised and carefully thought-out plans of observation such as are now being used by the Society, and also under circumstances of higher opportunity and greater facility by the Meteorological Office of the Government. The President incidentally remarked that he believed the recent researches into the vertical circulation of the water of the ocean under the influence of the different specific gravities of its distant parts was virtually tending to the establishment of the same great influence, as being the moving spring of the physical dynamics of both the ocean and the atmosphere. The President also in allusion to the recent establishment of a Permanent Lightning Rod Committee by the Society, gave a very interesting account of a visit he had recently made to Prof. Melsen, of Brussels, and described the experiments upon which the Professor is engaged in investigating the molecular changes brought about in conducting bodies by the passage through them of powerful discharges of high tension electricity. He also gave an elaborate account of the admirable system of defence against lightning, which has been adopted at the Hotel de Ville of Brussels. Some curious and notable instances of the molecular effects of lightning discharge were exhibited during the delivery of the latter portion of the address.—The following gentlemen were elected Officers and Council for the ensuing year:—President, Henry Storks Eaton, M.A. Vice-Presidents: Charles O. F. Cator, M.A., Rogers Field, Assoc. Inst. C.E., John Knox Laughton, F.R.A.S., Capt. Henry Toynbee, F.R.A.S. Treasurer, Henry Perigal, F.R.A.S. Trustees: Sir Antonio Brady, F.G.S., Stephen William Silver, F.R.G.S. Secretaries: George James Symons, John W. Tripe, M.D. Foreign Secretary, Robert H. Scott, F.R.S. Council: Percy Bicknell, Arthur Brewin, F.R.A.S., Charles Brooke, F.R.S., Cornelius Benjamin Fox, M.D., Frederic Gaster, James Park Harrison, M.A., Robert James Mann, M.D., F.R.A.S., William Carpenter Nash, Rev. Thomas Arthur Preston, M.A., William Sowerby, F.L.S., Charles Vincent Walker, F.R.S., George Mathus Whipple, F.R.A.S.

**Anthropological Institute, Jan. 25.**—Col. A. Lane Fox, president, in the chair.—Annual Meeting.—The Report of Council for 1875 was read.—The following were elected to serve as Officers and Council for 1876:—President, Col. A. Lane Fox, F.S.A. Vice-presidents: Prof. Geo. Busk, F.R.S., John Evans, F.R.S., A. W. Franks, F.R.S., Francis Galton, F.R.S., Geo. Harris, F.S.A., E. Burnet Tylor, F.R.S. Directors: E. W. Brabrook, F.S.A., Capt. Harold Dillon. Treasurer, J. Paik Harrison. Council: J. Beddoe, F.R.S., W. Blackmore, Sir Geo. Campbell, K.C.S.I., Hyde Clarke, J. Barnard Davis, F.R.S., W. Boyd Dawkins, F.R.S., Robert Dunn, F.R.C.S., David Forbes, F.R.S., Chas. Harrison, F.R.S.L., H. H. Howorth, Prof. T. McK. Hughes, F.G.S., Prof. Huxley, F.R.S., A. L. Lewis, Sir John Lubbock, Bart., F.R.S., F. G. H. Price, F.R.G.S., J. E. Price, F.S.A., Prof. Rolleston, F.R.S., C. R. Des Ruffières, F.R.S.L., Lord Arthur Russell, M.P., M. J. Walhouse.

**Institution of Civil Engineers, Jan. 18.**—Mr. G. R. Stephenson, president, in the chair.—The following paper was read:—On the ventilation and working of railway tunnels, by Mr. Gabriel James Morrison.

## GENEVA

Physical and Natural History Society, Jan. 6.—M. Ernest Favre took up the discussion which has existed for ten years among geologists and palæontologists on the limit of the Jurassic and Cretaceous beds in the Alps, where the beds are not separated, as in the Anglo-Parisian basin, by freshwater deposits. Oppel, in 1865, gave the name of Tithonic stage to the beds containing Cephalopodous and Coralline fauna, and which are found in the upper part of the Jurassic system. Geologists, mostly French, of whom M. Hébert is the best known representative, assigning a part of these deposits to the Cretaceous formation and regarding the zone of *Ammonites tenuilobatus* as Oxfordian because it is covered by Coraliferous beds, admit that there is in the Alps a great gap between the Oxfordian and the Cretaceous formations. German and Swiss geologists, on the contrary, find in the Alps the complete series of the Upper Jurassic system of the Jura. They have shown that Coraliferous is developed in nearly all the horizons of these beds, and not only in that to which D'Orbigny has given the name of Coralline stage, a name which ought to be suppressed; that the highly developed zone of *Ammonites tenuilobatus* in the Alps is Kimmeridgian, and that the Tithonic beds belong to the Jurassic formation. M. Favre has found in the Western Alps of Switzerland the complete series of these strata; he has described it in a memoir on the Upper Jurassic formation Voirons. This series has the following four divisions from below upwards:—1. The Oxford formation, properly so called. 2. The zone of *Ammonites bimammatus*, which contains many species of the zone of *Amn. transversarius*. 3. The zone of *Ammonites Acanthicus* and *A. tenuilobatus* (Astartian). 4. Tithonic beds, which are the equivalent of the Solenhofen beds. The Voirons formation includes Nos. 2 and 3. The passage from the Jurassic to the Cretaceous systems has been worked in a part of the Alps, without any interruption in the four divisions; and if we cannot find all the equivalents of the fossiliferous beds of the Jurassic basin, it should be remembered that the deposits have been placed in the former region in conditions different from those which have reigned in the second.

## PARIS

Academy of Sciences, Jan. 24.—Vice-Admiral Paris in the chair.—The following papers were read:—On the decomposition of water by platinum, by MM. Sainte-Claire Deville and Debray. When a mixture of cyanide of potassium with spongy platinum is heated in a glass vessel raised to 500° or 600° near a dish of tepid water, *in vacuo*, large quantities of hydrogen are produced, and a double cyanide of platinum and potassium. A concentrated solution of cyanide of potassium attacks platinum at the boiling temperature.—Action of monohydrated sulphuric acid on alcohols, by M. Berthelot. He measures the heat liberated in such reactions.—New case of aphasia or loss of speech, arising from loss of the co-ordinated movements necessary for the act of pronunciation of words, without any lesion of the intellectual faculties, by M. Bouillaud.—On the falling in of the Cirque de Salazie, in the Isle of Réunion, by M. Sainte-Claire Deville.—On the star 70  $\rho$  Ophiuchus, by M. Tisserand. He seeks to determine the orbit from 213 observations, comprising an entire revolution.—Report on the numbers of the *Revue d'Artillerie* submitted to examination of the Academy by the Minister of War.—Application of the mechanical theory of heat to the study of volatile liquids; simple relations between the latent heats, atomic weights, and tensions of vapours, by M. Pictet. *Inter alia*, latent heat multiplied by atomic weight (temperature and pressure being the same) gives a constant product. The difference of latent heats at any two temperatures multiplied by atomic weight is a constant number. The latent heats of all liquids are multiples of the specific heats.—Action of ammonia on rosaniline, by M. Jacquemin.—Researches on the constitution of collagenous matters, by MM. Schützenbeiger and Bourgeois.—Map of the globe in gnomonic projection on the horizon of the North Pole, by M. Thoulet.—On the action of cold on milk, and the products obtainable from it, by M. Tisserand. The rising of cream is quicker, and the volume of it greater, the nearer the temperature has been brought to zero; also the yield of butter is greater, and the milk creamed, butter and cheese are of better quality, the lower the temperature. The common practice might be greatly improved in this respect.—On the covariants of binary forms, by M. Jordan.—On a particular class of left inscriptible polygons, by M. Serret.—Magnetic actions on the rarefied gases in Geissler tubes (fourth note), by M. Chautard. The gaseous matter probably undergoes attraction or

repulsion under action of the magnet, resulting in compression against the side of the tube and change in the physical state of the luminous stream. The alteration of the spectrum by magnetism is more marked, the greater the diameter of the tube (from  $\frac{1}{2}$  mm. to 1 cm. in these experiments). With fluoride of silicium Geissler tubes, the author appears to find some indication of a new chemical reaction under magnetic influence.—On the spectrum of nitrogen and that of alkaline metals in Geissler tubes (continued), by M. Salet. He suggests that the lines described by Mr. Schuster in 1872 may have been those of sodium vapour.—On the action of heat in magnetisation, by M. Favre. Three phenomena observed:—1. Conservation of magnetism at any temperature, when the latter was maintained constant. 2. Diminution of the magnetism in cooling, at first slow, becoming very rapid after a time variable with the temperature of magnetisation. 3. Increase of the quantity of magnetism that remains after cooling, when the magnet is heated anew.—Note on a new system of electric lamp, with independent regulator, by M. Girouard.—On a new method of recording the movements of blood-vessels in man, by M. Mosso. We shall notice this separately.—Note on the development of the *Salmacina Dysteri*, Hux., by M. Giard. Several characters bring the embryo of *Salmacina* near that of Molluscs. The divergence between Molluscs and Annelids commences only after the Trochosphaera stage, and even after this there are many agreements. The parentage of Molluscs and Annelids is certainly nearer than that of the latter with Arthropods. The origin of the three groups must be sought among the Rotifers.—New fossil mammals from the deposits of phosphate of lime at Quercy, by M. Filhol.—Influence of various elements of manures on the development of the beet, and its saccharine richness, by M. Joulie.

French Physical Society, December 17, 1875.—M. Jamin communicated the formulæ which he has established to represent the distribution of magnetism in magnets furnished with contact armature. If the armature is indefinite, the magnetic intensity in the soft iron is represented by an exponent of a single term, as in the case of magnets of very great length; if the armature is shorter the intensity is given by the sum of the two exponents. The diminution of intensity in each point of the magnet follows the same law, and the constants of the formulæ may be determined by noting on the one hand that the total loss of magnetism on the magnet is equal to the gain in the armature, and on the other hand, that the intensity at the point of contact is the same in the armature and in the magnet.

## VIENNA

Imperial Academy of Sciences, Dec. 16, 1875.—On differential air thermometers, by M. Pfandl. Berthelot's air thermometer with capillary manometer has the drawback, that its data depend on the existing barometric state. M. Pfandl seeks to obviate this by his differential air thermometers. He gives various constructions of these.—On new fish species from the collections of the Imperial Zoological Museum, by M. Steindachner. Mostly species of siluroids from the Bay of Panama, &c.—On the flow of stratified clay under bodies pressed into it, by M. Obermayer.

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